Amendments to the Claims:

This listing of claims will replace all prior versions, and listings, of claims in the application.

In the Claims:

1. (currently amended) A detector for thermal neutrons, said detector comprising:

a layered structure having opposed surfaces and comprising pBN layers between the opposed surfaces, ~~at least a pBN layer~~ each of said pBN layers having a thickness of between 1-1000 microns ~~between the opposed edge surfaces~~;

at least one metalized contact on each of said opposed surfaces to detect the presence of neutrons striking one of the two opposed surfaces;

wherein a plurality of said pBN layers ~~is~~ are doped with an elemental dopant selected from the group consisting of carbon, silicon, titanium, aluminum, gallium, germanium, ~~or~~ and combinations thereof, for an electrical resistivity of less than about 10^{14} ohm-cm;

said elemental dopant being distributed across a c-plane in each of said doped pBN layers.

2. (currently amended) The neutron detector of claim 1, wherein each of said doped pBN layers is doped with oxygen as a second dopant.

3. (original) The neutron detector of claim 1, wherein each opposed surface has a plurality of metalized contacts, wherein the contacts are separated from each other by a distance of between 20 and 100 microns.

4. (currently amended) The neutron detector of claim 1, wherein the thickness between the opposed ~~edge~~ surfaces is less than about 100 microns.

5. (original) The neutron detector of claim 1, wherein said at least one contact is in the form selected from one of a metalized strip and a raised dot.

6. (currently amended) The neutron detector of claim 1, wherein each of said doped pBN

layers is doped with carbon in an amount of less than about 3 wt. %.

7. (currently amended) The neutron detector of claim 1, wherein the pBN in each of said doped pBN layers is produced by a vapor phase reaction process with a ^{10}B-enriched boron halide feed for said pBN to comprise at least 12 atomic % boron-10 (^{10}B) isotope.

8. (original) A system for measuring a thermal neutron emission from a neutron source, said system comprising the neutron detector of claim 1.

9. (original) A system for measuring a thermal neutron emission from a neutron source, said system comprising the neutron detector of claim 7.

10. (currently amended) A method of forming a neutron detector to detect the presence of neutrons, said method comprising the steps of:

forming a layered structure having opposed surfaces and comprising at least a plurality of layers having an electrical resistivity of less than about 10^{14} ohm-cm and a thickness of between 1-1000 microns between the opposed ~~edge~~ surfaces, said plurality of layers comprising pyrolitic boron nitride (pBN) containing boron-10 (^{10}B) isotope and an elemental dopant distributed across a c-plane in said plurality of layers, said elemental dopant being selected from the group consisting of carbon, silicon, titanium, aluminum, gallium, germanium, ~~or~~ and combinations thereof; and

forming electrical contacts on each of said ~~opposite sides~~ opposed surfaces of said ~~doped pBN layer~~ layered structure.

11. (currently amended) The method of claim 10, wherein forming electrical contacts on each of said ~~opposite sides comprising~~ opposed surfaces comprises the steps of carving channels on each of said ~~opposite sides~~ opposed surfaces and back-filling said channels with metalized strips.

12. (currently amended) The method of claim 10, wherein forming electrical contacts on each of said ~~opposite sides comprising~~ opposed surfaces comprises applying metalized contacts

to each of said ~~opposite sides~~ opposed surfaces.

13. (original) The method of claim 10, wherein said electrical contacts are in the form of strips separated from each other a distance of between 20 and 100 microns.

14. (currently amended) The method of claim10, wherein said electrical contacts are formed by a lithography process comprising the steps of:

forming a photosensitive resist layer on a surface of ~~the~~ a doped pBN ~~material~~ layer;

passing light through a mask onto the photosensitive resist layer with the mask having a desired pattern to create a cured image [[on]] of the pattern on the photosensitive resist layer where the light gets through the mask;

removing the cured resist from the resist layer to form channels in the resist ~~material~~ layer;

applying an etchant in said channels to form corresponding trenches in the doped pBN ~~material~~ layer below the channels;

evaporating metal material over the resist ~~material~~ layer and over the trenches; and

chemically removing the evaporated metal material and resist layer material except in the area of the trenches to form an array of metallized contact strips aligned parallel to each other.

15. (currently amended) The method of claim 10, wherein said electrical contacts are formed by ion implantation in which a dopant is implanted in the surface of ~~the~~ a pBN ~~material~~ layer forming metal contact strips having a controlled resistivity at the implanted surface of the pBN ~~material~~ layer.

16. (original) The method of claim 10, wherein said dopant is carbon.

17. (original) The method of claim 10, wherein said pBN comprises at least 12 atomic % ^{10}B.

18. (currently amended) A method for measuring a thermal neutron emission from a neutron source, said method ~~comprises~~ comprising:

a) providing a detector comprising: (i) a layered structure having opposed surfaces and comprising layers having an electrical resistivity of less than about 10^{14} ohm-cm and a thickness of between 1-1000 microns between the opposed ~~edge~~ surfaces, a plurality of said layers comprising pyrolytic boron nitride (pBN) containing boron-10 (^{10}B) isotope and an elemental dopant distributed across a c-plane, said elemental dopant being selected from the group consisting of carbon, silicon, titnaium, aluminum, gallium, germanium, ~~or~~ and combinations thereof; and (ii) at least one metalized contact on each of said opposed surfaces to detect the presence of neutrons striking one of the two opposed surfaces in a direction essentially perpendicular to the c-axis of the layered structure; and

b) exposing said detector to thermal neutrons which cause said detector to emit charges~~,~~ ~~which~~ that are subsequently recorded by an output device.

19. (original) The method of claim 18, wherein said pBN comprises at least 12 atomic % ^{10}B.

20. (currently amended) The method of claim 16, further comprising the step of orienting the detector relative to a source of neutrons for the neutrons to enter the detector and interact with the ^{10}B in said doped pBN layer for electrons to be released and conducted through said doped pBN layers.

21. (new) The neutron detector of claim 1, all of the pBN layers in said layered structure being doped with an elemental dopant selected from the group consisting of carbon, silicon, titanium, aluminum, gallium, germanium, and combinations thereof, for an electrical resistivity of less than about 10^{14} ohm-cm.

22. (new) The neutron detector of claim 21, said elemental dopant being distributed across a c-plane in each of the pBN layers in said layered structure.

23. (new) The neutron detector of claim 1, said doped pBN layers having an electrical resistivity on the order of 10^8 ohm-cm.